



Vehicle Traffic and Visitor Use of the Cadillac Mountain Summit Road 2015



Bus Descending Cadillac Mountain

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Executive Summary

The Cadillac Summit Road traffic data for 2013 – 2015 confirmed with numbers much of what we already knew intuitively and anecdotally about traffic and visitor numbers. Sunrise, sunset, holidays in the fall, and 10:00 a.m. to 5:00 p.m. in July and August are the busiest times. Daily traffic count data were cross-checked with a traffic counter set up by consultants RSG on the Summit Road in 2015 and are reliable. Hourly counts are less reliable, perhaps because the internal counter clocks were offset.

An estimated 259,000 vehicles and 777,000 visitors went to Cadillac Mountain between May 1, 2015 and October 30, 2015 (Table 1). Excluding May, when 2014 data was incomplete, the increase from 2014 was 9%. Strikingly, October use increased 35% from 2014. Visitation to Cadillac Mountain during the first two weeks of October 2015 was greater than the first two weeks of August, and there were slightly more visitors in October than in September. Daily traffic counts and visitation in July and August 2015 was about 1,600 – 2,000 vehicles and 4,800 – 6,000 visitors (Table 2). Weekends are a little busier than weekdays, though not usually in July and August.

The busiest day of the year came on Saturday October 3, when an estimated 3,722 vehicles and 11,166 visitors went to Cadillac Mountain (Table 3). This is 1,000 visitors per hour for substantial time periods. Each month has peak traffic days in excess of 2,000 vehicles per day. There were five days in October with more than 3,000 vehicles ascending to the summit but August still has the most days with greater than 2,000 vehicles per day. On the weekend holidays, Sunday is usually the busiest day.

Sunrise is consistently followed by a 3-hour lull in traffic. Ascending traffic following sunrise is often in the single digits per hour. In July and August, hourly traffic does not begin to consistently exceed 100 vehicles per hour until 10:00 a.m. and 9:00 a.m. respectively, and sometimes it reaches 200 vehicles per hour at these times. By monthly totals, the busiest hour of the day is consistently 11:00 a.m. to 12:00 p.m. While sunrise and sunset are weather dependent, the data show that if it is clear, holiday sunrises and sunsets are exceptionally busy times, especially in the fall. None of the road closures in 2015 came at sunrise or sunset. We do not know if closures may have been warranted at these times.

Length of stay data from a 2009 visitor survey of Cadillac Mountain visitors conducted by the Park Studies Laboratory at the University of Vermont (2011) showed for summit visitors who found a place to park, the mean and median length of stay were 45 and 40 minutes respectively. That these numbers are under one hour suggests a reason why congestion on Cadillac Mountain is not worse—turnover is quick. But it would be good to know how much of this fast turnover on a day like October 3, 2015 is due to vehicles simply giving up on finding a parking space and driving back down within the hour. Anything increasing the length of stay at the summit will increase congestion.

In spite of the road closures in 2015, we know that well over 3,000 vehicles were accommodated on October 3 and several other days without a closure, perhaps (a big perhaps) suggesting that if the number of vehicles and especially their rate of flow is managed (like cruise ship buses), closures can be avoided and many vehicles accommodated. This is not meant to imply that the number of visitors associated with this number of vehicles is acceptable based on either resource conditions or visitor experiences.

For the future, a new traffic counting site is needed in a better location. A better site would allow us to collect hourly data and classification data we can rely on. Near real-time data as was intended for the ITS system would be a bonus. As the Transportation Plan evolves over the next two years and the RSG model of Cadillac Mountain visitation becomes available in the spring of 2016, we should be better able to determine if our traffic monitoring needs are satisfied by the current program. Finally, we should better document the road closures with detailed reports and develop closure thresholds and procedures for Summit Stewards and other staff.

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INTRODUCTION

As the highest point on the east coast and with a road to the top, Cadillac Mountain is the focal point for Acadia National Park visitors because it offers sweeping views of an island-dotted landscape in all directions. A recent study reported that 75% of visitors went to the summit during their stay (Manni et al 2010).

In spite of the importance of the summit to the management of the park, there was not a working traffic counter to track visitor use of the site until 2013. Several efforts in the early 2000s provide a little bit of a window on use of Cadillac Mountain. Park staff conducted one day censuses of traffic (5:00 a.m. to 8:00 p.m.) and made estimates of the number of park visitors on 8/14/2001 and 8/1/2002 to provide a snapshot of use on a busy August day (Jacobi 2001, Jacobi 2003). Results suggested that a busy August day might have 1,700 – 2,000 vehicles and 5,000 – 6,000 visitors. Work by Baldwin and LaPage (2003) in the summer of 2002 suggested that visitation to Cadillac from June to September averaged around 3,620 per day. This is reasonably consistent with the two censuses conducted around the same time. Note that 2001 – 2003 was just before the cruise ship bus traffic increased substantially.

The Intelligent Transportation System (ITS) pilot project begun in 2000 included the installation of traffic loops and a traffic counter at the bottom of the summit road. This system was intended to provide real-time traffic information from many Park Loop Road entrances and parking areas via land lines and cell phones calling in to a central server/computer. After 13 years of contractor defaults, software system failures, and other problems, park and Federal Highways Administration staff determined the project should end.

In 2013, with the ITS project ended, park staff decided to try to resurrect the traffic counter site at the bottom of Cadillac Mountain with a counter provided by A.J. Nedzesky, a contractor with the National Park Service Traffic Field Operations Technical Support Center (FOTSC). The loops, wiring, and solar panels were all still workable and the equipment cabinet intact. We were not interested in real-time traffic information, only traffic counts downloadable each month, just like the three other counters in the park managed by FOTSC. FOTSC has since assimilated this counter as part of their operation in Acadia and provides support for it.

This report will summarize traffic data collected in 2015 with some estimations of visitor use based on Public Use Statistics Office methods and our own best judgment. We'll compare 2015 to the two previous years and compare our traffic counts to those of consultant Resource Systems Group (RSG) at a location uphill from ours. As we will describe further in the methods, this comparison suggests that *daily* counts from the FOTSC traffic counter are very reliable. *Hourly* counts however, are much less reliable and will be reported here with only appropriate cautionary notes. Hourly counts already reported for 2013 - 2014 (Jacobi 2015) should be considered in the same light.

METHODS

A history of the resurrection of the ITS traffic counter on Cadillac Mountain can be found in our 2013 – 2014 report (Jacobi 2015). FOTSC traffic data is collected by the hour for ascending and descending traffic. We download the counter, send data to FOTSC, and it is returned in a monthly report. The vehicle counts on the monthly reports are at best reliable to plus or minus 10%, the standard for this type of loop detector. There are a number of potential flaws in the setup of this particular site. It is located close between two curves; the loops are probably too wide (five feet) and thus lane separation is not ideal; the accuracy of motorcycle traffic is imperfect; and buses probably cross to center line too often, potentially confounding counts.

For 2015, we were able to compare August and September traffic count data from the FOTSC counter with data collected from the RSG counter just up the road. On a daily basis, these counts rarely differed by more than one percent (Appendix 1). On a count basis, this is no more than plus or minus 25 vehicles. Daily differences were also evenly distributed on a plus/minus basis. For traffic counters whose internal clocks were not synchronized this is very good and means that our FOTSC *daily* counts are reliable.

We also compared the hourly counts from these two counters for two busy days and two less busy days in August and September. For the two busy days we analyzed only those hours when both traffic counters recorded more than 100 vehicles per hour because our interest was focused on the high use hours. For the two less busy days we analyzed traffic counts between 8:00 a.m. and 6:00 p.m.

These were more highly variable, perhaps due in part to the lack of synchronization of clocks. While many hourly counts from these tests were off by 10% or less, too many were off by more than that, and too often more than 20% (Appendix 1). This means that any hourly traffic counts reported here should be viewed as within a fairly wide range and treated with caution. The focus should be on the relative magnitude of the numbers not the actual numbers.

In 2015, we installed the counter at end of April and removed it at the end of October. Data analysis included the following, some of which is simply pulled from the monthly FOTSC report.

1. We focused analysis mainly on ascending traffic with some work on descending traffic.
2. We made comparisons between 2013, 2014, and 2015 traffic counts.
3. We compiled seasonal, monthly, daily, and hourly data by total, mean, and peak traffic use including the date and time of peak use.
4. We converted vehicles to visitors using the summer season 3-person per vehicle multiplier established for the park. We assume this has not changed since 1990.
5. We compiled day-of-week and weekday-weekend tables for each month.
6. We compiled the number of days per month with greater than 2,000 or 3,000 vehicles per day.
7. We compiled the number of hours per month with greater than 200, 300, and 400 vehicles per hour.
8. We compiled maximum number of consecutive hours with greater than 200 vehicles per hour for each month and the date of these occurrences.

9. We looked at the number of days each month with greater than 200 vehicles per hour for sunrise and sunset.
10. We calculated vehicle accumulation for each hour of the two busiest days in 2015, September 6 and October 3. Accumulation counts measure the number of vehicles still in the Cadillac Summit Road system for each hour.
11. We compared traffic counts with the 2015 closures of the summit road due to congestion.
12. Note that all tables are extensively footnoted and that the footnotes matter.

Estimating the number of visitors based on the number of vehicles is straightforward but imperfect. We used the three person multiplier for *all* vehicles with the understanding that some of them, perhaps up to 50 a day at times, are buses with far more passengers. Thus when cruise ship buses are running, visitor estimates in this report are low by a few hundred to perhaps 1,000 – 2,000 per day. For example, 40 buses times ~40 passengers per bus equals 1,600 visitors that are counted as 40 times 3, or 120 visitors. In addition, there are up to several hundred hikers and perhaps 10-20 bicyclists arriving at the summit on any August day.

While classification data (vehicle size) is available from the traffic counter, it is unreliable. The location of the embedded loops encourages large vehicles to cross the center line confounding these counts. We will not report classification data in this report. We should also note that there are park and Dawnland Corporation concession vehicles going up Cadillac Mountain every day, and these are non-reportable visits. Our estimate is that these might amount to up to 20 per day in August, and less in shoulder months. Any effect they have on congestion is minor compared with visitor traffic, and they are of course included in these traffic counts.

RESULTS

Tables 1 - 5 show the vehicle counts for the total, mean, and peak number of vehicles ascending and/or descending Cadillac Mountain daily from June 1 through October 31, 2013, May 23 – October 31, 2014, and May 1 – October 30, 2015 as well as visitor estimates based on those counts, the dates and times of peak use, the busiest days of the week, and other statistics. Estimates for 2013 and 2015 are based on *ascending* traffic. Estimates for 2014 are based on *descending* traffic because ascending data was not available due to a programming error. Comparing the *monthly* and *daily* ascending and descending traffic is reasonable because the monthly differences between the two in 2013 and 2015 were usually under 100 vehicles with two very large exceptions in May (583) and June (807) of 2015.

An estimated 259,000 vehicles and 777,000 visitors went to Cadillac Mountain between May 1, 2015 and October 30, 2015 (Table 1). Excluding May, when 2014 data was incomplete, the increase from 2014 was 9%. Strikingly, October use increased 35% from 2014. Visitation to Cadillac Mountain during the first two weeks of October 2015 was greater than the first two weeks of August, and there were slightly more visitors in October than in September.

Why was there such a dramatic increase? Traffic counts clearly illustrate reduced traffic with drizzle and rain events. However, rainfall records for the first two weeks of October 2014 and 2015 are not substantially different. Solar radiation data (a proxy for the degree of cloud cover)

from the park's monitoring site at McFarland Hill showed only a 5.4% increase in solar radiation from 2014 to 2015. This does also not seem to be a substantial difference. It does not appear that better weather contributed much to this surge in October use. It is difficult to explain.

Table 1: Total Number of Vehicles and Visitors Ascending Cadillac Mountain June 1 – October 31, 2013, Descending Cadillac Mountain May 23 –October 31, 2014, and Ascending Cadillac Mountain May 1 – October 30, 2015, by Month.

Month	Vehicles 2013	Visitors 2013	Vehicles 2014 ¹	Visitors 2014	Vehicles 2015	Visitors 2015
May	--	--	7,853 ²	23,559 ^{2,3}	19,543	58,629
June	28,157	84,471 ³	30,622	91,866	31,927	95,781
July	49,888	149,664	51,690	155,070	55,195	165,585
August	57,264	171,792	60,276	180,828	60,010	180,030
Sept	42,027	126,081	42,616	127,848	45,653	136,959
Oct	8,694 ³	26,082 ⁴	34,500	103,500	46,586	139,758
Total	186,030	558,090	227,557	682,671	258,914	776,742

1. In 2014, we only obtained data from vehicles descending Cadillac Mountain due to a traffic counter glitch.

2. Data was collected only the last nine days of month which includes the Holiday weekend.

3. A three-person multiplier was applied to all vehicles regardless of size.

4. Government shutdown October 1-16 inclusive. No vehicle traffic.

Daily traffic counts and visitation in July and August 2015 was about 1,600 - 2,000 vehicles and 4,800 – 6,000 visitors (Table 2). Weekends are a little busier than weekdays, though not always in July and August.

Table 2: Mean Number of Vehicles Ascending (2013, 2015) or Descending (2014) Cadillac Mountain on Weekdays, Weekends, and Overall, and Daily Mean Number of Visitors Overall, June 1 – October 31, 2013, May 23 –October 31, 2014, May 1 – October 30, 2015, by Month.

Month/Year	Weekday Mean # of Vehicles	Weekend Mean # of Vehicles	Overall Mean # of Vehicles	Overall Daily Mean # of Visitors
May 2013	--	--	--	--
May 2014	622 ¹	1,443 ^{1,2}	906 ¹	2,718 ^{1,2}
May 2015	500	904	636	1,908
June 2013	864	1,088	939	2,817
June 2014	971	1,410	1,097	3,291
June 2015	1,076	1,245	1,124	3,372
July 2013	1,561	1,747	1,609	4,827
July 2014	1,633	1,767	1,667	5,001
July 2015	1,790	1,752	1,780	5,340
Aug 2013	1,739	2,113	1,847	5,541
Aug 2014	1,898	2,042	1,944	5,832
Aug 2015	1,960	1,884	1,936	5,808
Sept 2013	1,292	1,655	1,401	4,203
Sept 2014	1,366	1,570	1,421	4,263
Sept 2015	1,379	1,923	1,524	4,572
Oct 2013	497 ³	806 ³	580 ³	1,740 ³
Oct 2014	1,007	1,417	1,113	3,339
Oct 2015	1,431	2,067	1,606	4,818

1. Only last nine days of month including Holiday weekend.

3. Government shutdown October 1 – 16 inclusive. No traffic.

2. Three persons/vehicle multiplier applied to all vehicles.

The busiest day of the year came on Saturday October 3, when an estimated 3,722 vehicles and 11,166 visitors went to Cadillac Mountain (Table 3). Each month has peak traffic days in excess of 2,000 vehicles per day. There were five days in October with more than 3,000 vehicles ascending to the summit but August still has the most days with more than 2,000 vehicles per day. On the weekend holidays, Sunday is usually the busiest day.

Table 3: Daily Peak Number of Vehicles and Visitors Ascending (2013, 2015) or Descending (2014) Cadillac Mountain, Date of Peak Use, and Number of Days with > 2,000/3,000 Vehicles, by Month.

Month	Peak # of Vehicles	Peak # of Visitors ¹	Date of Peak Use	# of Days with Daily Vehicle Traffic > 2,000/3,000
May 2013	--	--	--	--
May 2014 ¹	2,111	6,333 ²	Sun 5/25/14 ³	1/0
May 2015	2,410	7,230	Sun 5/24/15 ³	1/0
June 2013	1,401	4,203	Mon 6/24/13	0/0
June 2014	2,005	6,015	Fri 6/27/14	1/0
June 2015	2,387	7,161	Wed 6/24/15	1/0
July 2013	2,548	7,644	Fri 7/5/13	8/0
July 2014	2,570	7,710	Tue 7/29/14	5/0
July 2015	2,609	7,827	Wed 7/22/15	9/0
Aug 2013	2,837	8,511	Sat 8/10/13	12/0
Aug 2014	2,633	7,899	Tue 8/12/14	16/0
Aug 2015	2,872	8,616	Thu 8/13/15	15/0
Sept 2013	2,791	8,373	Sun 9/1/13 ⁴	1/0
Sept 2014	2,123	6,369	Sat 9/27/14	2/0
Sept 2015	3,111	9,333	Sun 9/6/15 ⁴	3/1
Oct 2013	1,418 ⁵	4,254 ⁵	Sat 10/19/13	0/0
Oct 2014	2,933	8,799	Sun 10/12/14 ⁶	1/0
Oct 2015	3,722	11,166	Sat 10/3/15	10/5

1. For 2014, it's vehicles descending.

2. Three-person multiplier applied to all vehicles regardless of size.

3. Sunday of Memorial Day Weekend.

4. Sunday of Labor Day weekend.

5. Government shutdown October 1 – 16 inclusive. No traffic.

6. Sunday of Columbus Day Weekend.

The highest and lowest traffic days of the week for each month from 2013 – 2015 based on the mean traffic counts are shown in Table 4. Weather can be a strongly contributing factor if it rains on the same day in one or more weeks. The only apparent trend is that the highest traffic days are on the weekend in the shoulder season and usually on a weekday in July and August. Although 2014 data is for descending traffic, that should not have influenced the order.

Table 4: Days of the Week with the Highest and Lowest Traffic for 2013 - 2015 by Month, Based on the Mean Traffic Counts for Each Day.

Month	2013 Highest Traffic Day	2014 Highest Traffic Day	2015 Highest Traffic Day	2013 Lowest Traffic Day	2014 Lowest Traffic Day	2015 Lowest Traffic Day
May	-- ¹	-- ¹	Sunday	-- ¹	-- ¹	Tuesday
June	Sunday	Sunday	Wednesday	Friday	Thursday	Tuesday
July	Wednesday	Friday	Thursday	Tuesday	Monday	Sunday
August	Saturday	Tuesday	Thursday	Friday	Wednesday	Wednesday
Sept.	Saturday	Sunday	Sunday	Monday	Tuesday	Friday
Oct.	-- ¹	Sunday	Saturday	-- ¹	Wednesday	Tuesday

1. No data collected, or not enough data collected, to assign high or low day of week.

Peak hourly traffic counts for vehicles ascending Cadillac Mountain are greater than 200 vehicles per hour for many hours each month from July - October as shown in Table 5. Great caution should be used with all these hourly statistics however. A day of peak use can have as many as 5 – 9 consecutive hours of 200 vehicles per hour, usually in the middle of the day and in August merging into sunset. October 2015 had four days with nine such consecutive hours, and for eight consecutive hours between 10:00 a.m. and 6:00 p.m. on October 3, traffic was greater than 300 vehicles per hour. Many peak hours occur at sunset.

Table 5: Date, Time, and Peak Hourly Caution! Number of Vehicles Ascending (2013, 2015) or Descending (2014) Cadillac Mountain, by Month, with Other Peak Hourly Statistics.

Month	Date and Time of Peak Hourly Vehicle Use		Peak Hourly Vehicle Use	Hours/ Month with > 200/300/400 Vehicles/Hour	Most Consecutive Hours With > 200 Vehicles/Hour	Date/Time of Most Consecutive Hours > 200/Hour	
May 2013	--		--	--	--	--	
May 2014 ¹	Sun ² 5/25,	7p – 8p ³	310 ⁴	4/0/0	3	Sun 5/25	11a-2p
May 2015	Sun ² 5/24	12n – 1p	249	6/0	5	Sun 5/24	11a-4p
June 2013	Sun 6/30	11a – 12n	165	0/0/0	0	--	
June 2014	Fri 6/27	8p – 9p ³	218 ⁴	1/0/0	1	Fri 6/27	8p-9p
June 2015	Mon 6/24	10a – 11a	220	4/0/0	3	Wed 6/24	10a-1p
	Mon 6/24	12n – 1p	220				
July 2013	Wed 7/24	10a – 11a	285	34/0/0	6	Wed 7/3	10a-4p
July 2014	Tue 7/29	3p – 4p	313 ⁴	41/1/0	7	Tue 7/29	11a-6p
July 2015	Wed 7/22,	10a – 11a	349	47/3/0	5	Sat 7/4	10a-3p
						Thu 7/16	10a-3p
Aug 2013	Sat 8/10	10a – 11a	295	47/0/0	7	Sat 8/10	9a-4p
Aug 2014	Sat 8/30 ⁵	7p – 8p ³	391 ⁴	79/1/0	6	Tue 8/12	12n-6p
Aug 2015	Thu 8/27	11a – 12n	307	59/1/0	5	Thu 8/13	10a-3p
Sept 2013	Sun 9/1 ⁵	6p - 7p ³	304	22/1/0	8	Sun 9/1	11a-7p
Sept 2014	Sat 9/27	2p – 3p	266 ⁴	12/0/0	3	Sat 9/27	2p-5p
Sept 2015	Sun 9/6 ⁵	6p – 7p ³	354	26/5/0	9	Sun 9/6	10a-7p
Oct 2013 ⁶	Sat 10/19,	4p - 5p ³	171	0/0/0	0	--	
Oct 2014	Sun 10/12 ⁷	6p – 7p ³	367 ⁴	31/0/0	8	Sun 10/12	11a-7p
Oct 2015	Sat 10/3	5p – 6p ³	448	87/32/4	9 ⁸	Sat 10/3, Sun 10/4, Tue 10/5	Wed 10/7 All 9a-6p ⁹

1. For 2014, it's vehicles descending.

2. Memorial Day Weekend.

3. Sunset

4. This is a descending count and not as easily compared with ascending numbers in 2013 and 2015.

5. Labor Day weekend.

6. Government shutdown October 1 – 16 inclusive. No traffic

7. Columbus Day Weekend.

8. Eight consecutive hours were over 300 vehicles per hour.

9. Yes this mean there were four days with nine consecutive hours of more than 200 vehicles per hour.

These other facts can be gleaned about vehicle traffic *ascending* Cadillac Mountain in 2013 and 2015. Remember hourly counts must be treated with great caution and in terms of relative rather than actual magnitude.

- In August 2013, traffic was greater than 100 vehicles per hour for 261 of the 310 hours (84%) between 9:00 a.m. and 7:00 p.m.

- In August 2015, traffic was greater than 100 vehicles per hour for 273 of the 310 hours (88%) between 9:00 a.m. and 7:00 p.m.
- The earliest traffic reached 200 vehicles/hour (excluding sunrise) in July 2013 was 10:00 a.m. - 11:00 a.m. (n=6 days, peak of 285).
- The earliest traffic reached 200 vehicles/hour (excluding sunrise) in July 2015 was 10:00 a.m. - 11:00 a.m. (n=6 days, peak of 349).
- The earliest traffic reached 200 vehicles/hour (excluding sunrise) in August 2013 was 9:00 a.m. - 10:00 a.m. (n=1 day, peak of 201).
- The earliest traffic reached 200 vehicles/hour (excluding sunrise) in August 2015 was 9:00 a.m. - 10:00 a.m. (n=1 day, peak of 237).
- In July and August 2013 and 2015 the highest ascending traffic occurred from 11:00 a.m. to 12:00 p.m.
- Traffic from 5:00 p.m. to 7:00 p.m. in July 2013 and 2015 was sometimes under 100 vehicles/hour until the last week of the month when it began to exceed that rate. In August there is no similar lull because sunset is earlier.
- Sunrise is followed by a 3-hour lull in traffic. In July and August, hourly traffic does not begin to consistently exceed 100 vehicles per hour until 10:00 a.m. and 9:00 a.m. respectively. Ascending traffic following sunrise is often in the single digits per hour.
- While sunrise and sunset are weather dependent, the data show that if it is clear, holiday sunrises and sunsets are exceptionally busy times, especially in the fall. None of the road closures in 2015 came at sunrise or sunset.

Table 6 shows the number of days in July and August 2013 and 2015 when traffic ascending Cadillac Mountain was greater than 200 vehicles per hour for sunrise and sunset. Caution should again be used with these data. Sunset usually has higher traffic and greater potential for parking and congestion problems because visitors are more likely to arrive early and linger longer.

Table 6: Number of Days in July and August 2013 and 2015 when Traffic Ascending Cadillac Mountain was Greater Than 200 vehicles per hour for Sunrise and Sunset.		
	Sunrise	Sunset
Month	# Days > 200hr (caution)	# Days >200/hr
July 2013	1	3
July 2015	4	2
Month	# Days > 200hr	# Days > 200hr
Aug 2013	0	5
Aug 2015	6	7
Month	# Days > 200hr	# Days > 200hr
Sept 2013	0	2
Sept 2015	4	3
Month	# Days > 200hr	# Days > 200hr
Oct 2013	0	0
Oct 2015	6	5

VEHICLE ACCUMULATION COUNTS

We compiled traffic accumulation counts for the two busiest days of the season, September 6 and October 3. These accumulation counts calculate how many vehicles are on the Cadillac Mountain Summit Road system during each hour of the day based on ascending and descending traffic counts. Accumulated vehicles may be parked along the 3.5 mile road and in pulloffs, in the Summit or Blue Hill parking areas, or be in transit during each hour. That's a lot of geography, and length of stay is a crucial factor in understanding accumulation as well. Because the hourly data are less reliable, we include this data in Appendix 2, but can offer the following general observation. Accumulated traffic counts on these two very busy days were more than (and often considerably more than) the 168 designated spaces in the Summit and Blue Hill parking lots at the sunrise and sunset hours and from 10:00 a.m. to 5:00 p.m.

TRAFFIC COUNTS AND CADILLAC SUMMIT ROAD CLOSURES

Park rangers were forced to close the Cadillac Mountain summit road seven times on five days last summer and fall. All closures were between 10:00 a.m. and 5:00 p.m. None occurred at sunrise or sunset and none occurred around holidays, and we do not know if closures may have been warranted at these times. The road was closed on three days in August and one each in July and September. Closures were for 17, 21, 22, 35, 43, 44, and 60 minutes. The average closure time was 39 minutes. Records of closure, especially timing, were determined from radio call logs. Cadillac Summit Stewards noted two other closures in their report (Ellis et al 2016), but there was no radio call record of closures for August 9 and 26, and they are not included here.

Table 7 shows the 2015 closures with dates, times, and traffic counts from 9:00 a.m. to 5:00 p.m. Reduced traffic counts show up for six of the seven closures and are highlighted in bold. On July 22 and September 12 (2nd closure) there were high volumes of traffic before the closure. But the most striking result is the lack of consistency between traffic data and closures, even given our cautionary notes about hourly traffic data. September 12 was the date of the evening star party on Cadillac Mountain and the road closed again at 5:30 p.m. to prepare for the event. There was significantly more traffic on many other days when there were no road closures.

**Table 7: Dates and Times of Cadillac Summit Road Closures in 2015
with Ascending Traffic Counts.**

Date ¹	Closure Time(s)	1000 ²	1100	1200	1300	1400	1500	1600	1700	Daily Total ⁴
7/22	1300-1400	185	349	328	239	21 ³	236	227	221	2,609
8/5	1200-1235	186	212	241	66	177	223	201	170	2,258
8/24	1400-1417, 1513-1535	63	116	160	179	189	246	164	200	2,040
8/27	1030-1051	237	135	307	214	238	180	161	164	2,436
9/12	1323-1407, 1614-1657	126	194	235	271	80	312	256	65	1,958

1. Newspaper accounts of closures were: Mount Desert Islander 8/12; Bangor Daily News 9/16.

2. Traffic counts are for the preceding hour, in this case 0900 – 1000.

3. Numbers in bold indicate where traffic counts were clearly reduced due to the closure.

4. Ascending traffic.

SUMMARY AND RECOMMENDATIONS

The Cadillac Summit Road data for 2013 – 2015 confirms with numbers much of what we already knew intuitively and anecdotally about traffic and the number of visitors. Sunrise, sunset, holidays in the fall, and 10:00 a.m. to 5:00 p.m. are the busiest times. In August, the only lull in traffic on a sunny day is the few hours after sunrise. On the busiest day, October 3, 2015, there may have been 1,000 visitors per hour passing through the summit. In spite of the number of closures of the road, we know that well over 3,000 vehicles were accommodated on October 3 without a closure, perhaps suggesting that if the number of vehicles is managed, closures can be avoided and many visitors can enjoy all the summit offers. This is not to suggest that the resource impacts or visitor experience under this level of use is acceptable.

Length of stay data from a 2009 visitor survey of Cadillac Mountain visitors conducted by the Park Studies Laboratory at the University of Vermont (2011) showed that for visitors who found a place to park, the mean and median length of stay were 45 and 40 minutes respectively. That these numbers are under one hour suggests a reason why congestion on Cadillac Mountain is not worse—turnover is quick. But it would be valuable to know how much of this fast turnover on a day like October 3, 2015 is due to vehicles simply giving up on finding a parking space and driving back down within an hour. Anything increasing the length of stay at the summit will increase congestion.

For now, the FOTSC traffic counter is providing good data on *daily* use of Cadillac Mountain. Obtaining reliable *hourly* data is still possible but requires more work. Our comparison of hourly data with the RGG traffic counter suggests that validation of FOTSC hourly traffic counts in 2016 is needed assess their reliability.

For the future, a new traffic counting site is needed in a better location. A better site would allow us to collect hourly data and classification data we can rely on. Near real-time data as was intended for the ITS system would be a bonus. As the Transportation Plan evolves and the RSG model of Cadillac Mountain visitation becomes available, we should be better able to determine if our traffic monitoring needs differ from the current program. Finally, we should better document the closures with detailed reports and develop closure thresholds and procedures for Summit Stewards and other staff.

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APPENDIX 1: COMPARISON OF DAILY AND HOURLY FOTSC AND RSG TRAFFIC COUNTS FOR AUGUST AND SEPTEMBER 2015.

Daily Uphill

Daily Total Vehicle Counts					Abs Value		
Date	UphillRSG	UphillFOTSC	FOTSC-RSG	PercentFOTSC/RSG	(FOTSC-RSG)/FOTSC	(FOTSC-RSG)/FOTSC	
8/1/2015	2028	2020	-8	99.61%	0.0040		
8/2/2015	2116	2122	6	100.28%	0.0028	Mean	0.004362333
8/3/2015	2201	2197	-4	99.82%	0.0018	Standard Error	0.000514133
8/4/2015	1985	1996	11	100.55%	0.0055	Median	0.003586219
8/5/2015	2262	2258	-4	99.82%	0.0018	Mode	0
8/6/2015	2354	2373	19	100.81%	0.0080	Standard Deviation	0.003915522
8/7/2015	1983	1997	14	100.71%	0.0070	Sample Variance	1.53313E-05
8/8/2015	1973	1981	8	100.41%	0.0040	Kurtosis	10.6828825
8/9/2015	1940	1949	9	100.46%	0.0046	Skewness	2.669645731
8/10/2015	2514	2514	0	100.00%	0.0000	Range	0.024038462
8/11/2015	1544	1546	2	100.13%	0.0013	Minimum	0
8/12/2015	1696	1700	4	100.24%	0.0024	Maximum	0.024038462
8/13/2015	2878	2872	-6	99.79%	0.0021	Sum	0.25301531
8/14/2015	2271	2260	-11	99.52%	0.0049	Count	58
8/15/2015	1975	1967	-8	99.59%	0.0041	Confidence Level(95.	0.001029534
8/16/2015	2104	2112	8	100.38%	0.0038		
8/17/2015	2073	2077	4	100.19%	0.0019		
8/18/2015	2267	2258	-9	99.60%	0.0040	Bin	Number
8/19/2015	2068	2079	11	100.53%	0.0053	0	2
8/20/2015	1884	1880	-4	99.79%	0.0021	0.005	39
8/21/2015	1286	1291	5	100.39%	0.0039	0.01	14
8/22/2015	1667	1673	6	100.36%	0.0036	0.015	2
8/23/2015	1730	1736	6	100.35%	0.0035	0.02	0
8/24/2015	2047	2040	-7	99.66%	0.0034		1
8/25/2015	1448	1450	2	100.14%	0.0014		
8/26/2015	573	579	6	101.05%	0.0104		
8/27/2015	2431	2436	5	100.21%	0.0021		
8/28/2015	2093	2094	1	100.05%	0.0005		
8/29/2015	1775	1774	-1	99.94%	0.0006		
8/30/2015	1517	1509	-8	99.47%	0.0053		
8/31/2015	1270	1270	0	100.00%	0.0000		
9/1/2015	1250	1245	-5	99.60%	0.0040		
9/2/2015	1130	1136	6	100.53%	0.0053		
9/3/2015	1173	1171	-2	99.83%	0.0017		
9/4/2015	1352	1339	-13	99.04%	0.0097		
9/5/2015	2302	2311	9	100.39%	0.0039		
9/6/2015	3131	3111	-20	99.36%	0.0064		
9/7/2015	1937	1934	-3	99.85%	0.0016		
9/8/2015	1391	1389	-2	99.86%	0.0014		
9/9/2015	1409	1414	5	100.35%	0.0035		
9/10/2015	1250	1258	8	100.64%	0.0064		
9/11/2015	626	617	-9	98.56%	0.0146		
9/12/2015	1956	1958	2	100.10%	0.0010		
9/13/2015	1141	1140	-1	99.91%	0.0009		
9/14/2015	1540	1545	5	100.32%	0.0032		
9/15/2015	1945	1952	7	100.36%	0.0036		
9/16/2015	1685	1670	-15	99.11%	0.0090		
9/17/2015	1564	1552	-12	99.23%	0.0077		
9/18/2015	1499	1487	-12	99.20%	0.0081		
9/19/2015	1788	1771	-17	99.05%	0.0096		
9/20/2015	1542	1538	-4	99.74%	0.0026		
9/21/2015	1639	1643	4	100.24%	0.0024		
9/22/2015	1065	1040	-25	97.65%	0.0240		
9/23/2015	1732	1735	3	100.17%	0.0017		
9/24/2015	1549	1542	-7	99.55%	0.0045		
9/25/2015	1354	1355	1	100.07%	0.0007		
9/26/2015	1479	1470	-9	99.39%	0.0061		
9/27/2015	2090	2083	-7	99.67%	0.0034		
Neg	28		-56				
Pos	28	Average	-0.97				
Zero	2	Max	19				
	58	Min	-25				

Daily Downhill

Daily Total Vehicle Counts					Abs Value		
Date	DownhillRSG	DownhillFOTSC	FOTSC-RSG	PercentFOTSC/RSG	(FOTSC-RSG)/FOTSC	(FOTSC-RSG)/FOTSC	
8/1/2015	2043	2034	-9	99.56%	0.0044		
8/2/2015	2111	2130	19	100.90%	0.0089	Mean	0.005230932
8/3/2015	2194	2202	8	100.36%	0.0036	Standard Error	0.000574704
8/4/2015	1991	1994	3	100.15%	0.0015	Median	0.004117513
8/5/2015	2252	2269	17	100.75%	0.0075	Mode	#N/A
8/6/2015	2350	2359	9	100.38%	0.0038	Standard Deviation	0.004376812
8/7/2015	1987	2002	15	100.75%	0.0075	Sample Variance	1.91565E-05
8/8/2015	1985	1984	-1	99.95%	0.0005	Kurtosis	7.61187804
8/9/2015	1942	1954	12	100.62%	0.0061	Skewness	2.417398822
8/10/2015	2503	2511	8	100.32%	0.0032	Range	0.022840119
8/11/2015	1560	1558	-2	99.87%	0.0013	Minimum	0
8/12/2015	1653	1665	12	100.73%	0.0072	Maximum	0.022840119
8/13/2015	2891	2878	-13	99.55%	0.0045	Sum	0.303394027
8/14/2015	2290	2288	-2	99.91%	0.0009	Count	58
8/15/2015	1963	1959	-4	99.80%	0.0020	Confidence Level(95.0%)	0.001150824
8/16/2015	2105	2116	11	100.52%	0.0052		
8/17/2015	2082	2072	-10	99.52%	0.0048		
8/18/2015	2253	2262	9	100.40%	0.0040	Bin	Number
8/19/2015	2067	2079	12	100.58%	0.0058	0	1
8/20/2015	1890	1883	-7	99.63%	0.0037	0.005	36
8/21/2015	1284	1286	2	100.16%	0.0016	0.01	16
8/22/2015	1685	1680	-5	99.70%	0.0030	0.015	3
8/23/2015	1735	1728	-7	99.60%	0.0041	0.02	0
8/24/2015	2043	2039	-4	99.80%	0.0020		2
8/25/2015	1455	1458	3	100.21%	0.0021		
8/26/2015	574	578	4	100.70%	0.0069		
8/27/2015	2429	2423	-6	99.75%	0.0025		
8/28/2015	2100	2084	-16	99.24%	0.0077		
8/29/2015	1778	1786	8	100.45%	0.0045		
8/30/2015	1517	1516	-1	99.93%	0.0007		
8/31/2015	1282	1274	-8	99.38%	0.0063		
9/1/2015	1246	1257	11	100.88%	0.0088		
9/2/2015	1124	1128	4	100.36%	0.0035		
9/3/2015	1182	1177	-5	99.58%	0.0042		
9/4/2015	1339	1339	0	100.00%	0.0000		
9/5/2015	2292	2279	-13	99.43%	0.0057		
9/6/2015	3117	3091	-26	99.17%	0.0084		
9/7/2015	1951	1944	-7	99.64%	0.0036		
9/8/2015	1392	1399	7	100.50%	0.0050		
9/9/2015	1418	1411	-7	99.51%	0.0050		
9/10/2015	1254	1258	4	100.32%	0.0032		
9/11/2015	628	614	-14	97.77%	0.0228		
9/12/2015	1951	1956	5	100.26%	0.0026		
9/13/2015	1151	1138	-13	98.87%	0.0114		
9/14/2015	1546	1544	-2	99.87%	0.0013		
9/15/2015	1943	1950	7	100.36%	0.0036		
9/16/2015	1680	1673	-7	99.58%	0.0042		
9/17/2015	1565	1549	-16	98.98%	0.0103		
9/18/2015	1493	1473	-20	98.66%	0.0136		
9/19/2015	1791	1775	-16	99.11%	0.0090		
9/20/2015	1532	1538	6	100.39%	0.0039		
9/21/2015	1641	1645	4	100.24%	0.0024		
9/22/2015	1030	1007	-23	97.77%	0.0228		
9/23/2015	1726	1722	-4	99.77%	0.0023		
9/24/2015	1552	1545	-7	99.55%	0.0045		
9/25/2015	1362	1357	-5	99.63%	0.0037		
9/26/2015	1482	1471	-11	99.26%	0.0075		
9/27/2015	2086	2081	-5	99.76%	0.0024		
Neg	33	Sum	-96				
Pos	24	Average	-1.66				
Zero	1	Max	19				
	58	Min	-26				

Hourly Uphill and Downhill 9/6/15: Busy Day

9/6/2015					Abs Value			
Hour	UphillRSG	UphillFOTSC	FOTSC-RSG	PercentFOTSC/RSG	(FOTSC-RSG)/FOTSC	For> 100 Traffic		
0	3	3	0	100.00%	0.0000	0.0965	For> 100 Traffic	
1	0	1	1		1.0000	0.0000		
2	1	0	-1	0.00%		0.1250	Mean	0.067661062
3	2	3	1	150.00%	0.3333	0.0977	Standard Error	0.012294691
4	30	63	33	210.00%	0.5238	0.0995	Median	0.059859155
5	341	311	-30	91.20%	0.0965	0.0586	Mode	#N/A
6	17	13	-4	76.47%	0.3077	0.0460	Standard Deviation	0.040776878
7	19	28	9	147.37%	0.3214	0.0216	Sample Variance	0.001662754
8	58	62	4	106.90%	0.0645	0.0293	Kurtosis	-1.218675021
9	133	133	0	100.00%	0.0000	0.0599	Skewness	-0.227576301
10	231	264	33	114.29%	0.1250	0.1102	Range	0.125
11	292	266	-26	91.10%	0.0977		Minimum	0
12	199	221	22	111.06%	0.0995		Maximum	0.125
13	253	239	-14	94.47%	0.0586		Sum	0.744271683
14	273	261	-12	95.60%	0.0460		Count	11
15	236	231	-5	97.88%	0.0216		Confidence Level(95.0%)	0.027394279
16	232	239	7	103.02%	0.0293			
17	267	284	17	106.37%	0.0599			
18	393	354	-39	90.08%	0.1102			
19	46	34	-12	73.91%	0.3529			
20	23	23	0	100.00%	0.0000			
21	46	52	6	113.04%	0.1154			
22	23	17	-6	73.91%	0.3529			
23	13	9	-4	69.23%	0.4444			
Total		Sum	-20					
		Average	-0.83	100.69%	0.1983			
		Neg	11					
		Pos	10					
		Zero	3					
			24					

9/6/2015					Abs Value			
Hour	DownhillRSG	DownhillFOTSC	FOTSC-RSG	PercentFOTSC/RSG	(FOTSC-RSG)/FOTSC	For>100Traffic		
0	12	12	0	100.00%	0.0000	0.0810	For>100Traffic	
1	1	1	0	100.00%	0.0000	0.1339		
2	1	1	0	100.00%	0.0000	0.0894	Mean	0.070174
3	0	1	1		1.0000	0.0156	Standard Error	0.018492
4	1	2	1	200.00%	0.5000	0.0080	Median	0.04386
5	3	3	0	100.00%	0.0000	0.0159	Mode	#N/A
6	295	321	26	108.81%	0.0810	0.0439	Standard Deviation	0.061331
7	89	68	-21	76.40%	0.3088	0.0268	Sample Variance	0.003761
8	32	36	4	112.50%	0.1111	0.0254	Kurtosis	-0.99972
9	55	63	8	114.55%	0.1270	0.1531	Skewness	0.726898
10	110	127	17	115.45%	0.1339	0.1790	Range	0.170939
11	224	246	22	109.82%	0.0894		Minimum	0.008032
12	260	256	-4	98.46%	0.0156		Maximum	0.178971
13	251	249	-2	99.20%	0.0080		Sum	0.771909
14	248	252	4	101.61%	0.0159		Count	11
15	238	228	-10	95.80%	0.0439		Confidence Level(95.0%)	0.041203
16	268	261	-7	97.39%	0.0268			
17	202	197	-5	97.52%	0.0254			
18	166	196	30	118.07%	0.1531			
19	527	447	-80	84.82%	0.1790			
20	38	31	-7	81.58%	0.2258			
21	35	38	3	108.57%	0.0789			
22	40	40	0	100.00%	0.0000			
23	21	15	-6	71.43%	0.4000			
Total		Sum	-26					
		Average	-1.08	104.00%	0.1468			
		Neg	9					
		Pos	10					
		Zero	5					
			24					

Hourly Uphill and Downhill 8/13/15: Busy Day

8/13/2015					Abs Value			
Hour	UphillRSG	UphillFOTSC	FOTSC-RSG	PercentFOTSC/RSG	(FOTSC-RSG)/FOTSC			
0	19	15	-4	78.95%	0.2667	For> 100 Traffic	For> 100 Traffic	
1	15	14	-1	93.33%	0.0714	0.2000		
2	6	7	1	116.67%	0.1429	0.1279	Mean	0.08785265
3	27	33	6	122.22%	0.1818	0.0078	Standard Error	0.021362743
4	172	215	43	125.00%	0.2000	0.0401	Median	0.06212848
5	109	58	-51	53.21%	0.8793	0.0472	Mode	#N/A
6	9	12	3	133.33%	0.2500	0.0959	Standard Deviation	0.074002714
7	28	28	0	100.00%	0.0000	0.0601	Sample Variance	0.005476402
8	73	89	16	121.92%	0.1798	0.0642	Kurtosis	1.601358989
9	150	172	22	114.67%	0.1279	0.0318	Skewness	1.469213652
10	256	258	2	100.78%	0.0078	0.0438	Range	0.250751463
11	285	274	-11	96.14%	0.0401	0.0769	Minimum	0.007751938
12	222	233	11	104.95%	0.0472	0.2585	Maximum	0.258503401
13	240	219	-21	91.25%	0.0959		Sum	1.054231804
14	219	233	14	106.39%	0.0601		Count	12
15	199	187	-12	93.97%	0.0642		Confidence Level(95.0%)	0.047019081
16	162	157	-5	96.91%	0.0318			
17	131	137	6	104.58%	0.0438			
18	192	208	16	108.33%	0.0769			
19	185	147	-38	79.46%	0.2585			
20	42	47	5	111.90%	0.1064			
21	70	71	1	101.43%	0.0141			
22	55	50	-5	90.91%	0.1000			
23	12	8	-4	66.67%	0.5000			
Total		Sum	-6					
		Average	-0.25	100.54%	0.1561			
		Neg	10					
		Pos	13					
		Zero	1					
			24					

8/13/2015					Abs Value			
Hour	DownhillRSG	DownhillFOTSC	FOTSC-RSG	PercentFOTSC/RSG	(FOTSC-RSG)/FOTSC			
0	26	22	-4	84.62%	0.1818			
1	18	16	-2	88.89%	0.1250			
2	14	15	1	107.14%	0.0667	For> 100 Traffic	For> 100 Traffic	
3	7	8	1	114.29%	0.1250	0.301507538		
4	3	2	-1	66.67%	0.5000	0.550458716	Mean	0.172196
5	139	199	60	143.17%	0.3015	0.070588235	Standard Error	0.065555
6	169	109	-60	64.50%	0.5505	0.076595745	Median	0.070588
7	22	25	3	113.64%	0.1200	0.007575758	Mode	#N/A
8	24	25	1	104.17%	0.0400	0.003968254	Standard Deviation	0.236363
9	62	69	7	111.29%	0.1014	0.024896266	Sample Variance	0.055868
10	158	170	12	107.59%	0.0706	0.024691358	Kurtosis	2.005561
11	217	235	18	108.29%	0.0766	0.02	Skewness	1.672365
12	266	264	-2	99.25%	0.0076	0.091503268	Range	0.743858
13	253	252	-1	99.60%	0.0040	0.035087719	Minimum	0.003968
14	247	241	-6	97.57%	0.0249	0.283842795	Maximum	0.747826
15	237	243	6	102.53%	0.0247	0.747826087	Sum	2.238542
16	204	200	-4	98.04%	0.0200		Count	13
17	167	153	-14	91.62%	0.0915		Confidence Level(95.0%)	0.142833
18	118	114	-4	96.61%	0.0351			
19	164	229	65	139.63%	0.2838			
20	201	115	-86	57.21%	0.7478			
21	52	56	4	107.69%	0.0714			
22	84	85	1	101.19%	0.0118			
23	39	31	-8	79.49%	0.2581			
Total		Sum	-13					
		Average	-0.54	99.36%	0.1600			
		Neg	12					
		Pos	12					
		Zero	0					
			24					

Hourly Uphill and Downhill 9/11/15: Less Busy Day

9/11/2015					Abs Value			
Hour	UphillRSG	UphillFOTSC	FOTSC-RSG	PercentFOTSC/RSG	(FOTSC-RSG)/FOTSC			
0	0	0	0			For9a - 6p Traffic	<i>For9a - 6p Traffic</i>	
1	0	0	0			0.0370		
2	0	0	0			0.1333	Mean	0.081496476
3	0	0	0			0.0263	Standard Error	0.016897473
4	0	0	0			0.1034	Median	0.080438379
5	2	3	1	150.00%	0.3333	0.0968	Mode	#N/A
6	1	0	-1	0.00%		0.0641	Standard Deviation	0.053434503
7	3	3	0	100.00%	0.0000	0.0357	Sample Variance	0.002855246
8	9	15	6	166.67%	0.4000	0.0167	Kurtosis	-1.118076253
9	28	27	-1	96.43%	0.0370	0.1277	Skewness	0.374626371
10	52	60	8	115.38%	0.1333	0.1739	Range	0.157246377
11	78	76	-2	97.44%	0.0263		Minimum	0.016666667
12	64	58	-6	90.63%	0.1034		Maximum	0.173913043
13	56	62	6	110.71%	0.0968		Sum	0.814964764
14	83	78	-5	93.98%	0.0641		Count	10
15	87	84	-3	96.55%	0.0357		Confidence Level(95.0%)	0.038224741
16	61	60	-1	98.36%	0.0167			
17	53	47	-6	88.68%	0.1277			
18	27	23	-4	85.19%	0.1739			
19	10	8	-2	80.00%	0.2500			
20	4	5	1	125.00%	0.2000			
21	2	1	-1	50.00%	1.0000			
22	4	4	0	100.00%	0.0000			
23	2	3	1	150.00%	0.3333			
Total		Sum	-9					
		Average	-0.38	99.74%	0.1851			
		Neg	11					
		Pos	6					
		Zero	7					
			24					

9/11/2015					Abs Value			
Hour	DownhillRSG	DownhillFOTSC	FOTSC-RSG	PercentFOTSC/RSG	(FOTSC-RSG)/FOTSC			
0	0	0	0			For9a - 6p Traffic	<i>For9a - 6p Traffic</i>	
1	0	0	0			0.2500		
2	0	0	0			0.3077	Mean	0.18484
3	0	0	0			0.1026	Standard Error	0.057053
4	0	0	0			0.0625	Median	0.099475
5	0	2	2		1.0000	0.0536	Mode	#N/A
6	3	1	-2	33.33%	2.0000	0.0964	Standard Deviation	0.180417
7	0	3	3		1.0000	0.0575	Sample Variance	0.03255
8	7	9	2	128.57%	0.2222	0.2131	Kurtosis	3.987079
9	21	28	7	133.33%	0.2500	0.0755	Skewness	1.925915
10	36	52	16	144.44%	0.3077	0.6296	Range	0.576058
11	70	78	8	111.43%	0.1026		Minimum	0.053571
12	68	64	-4	94.12%	0.0625		Maximum	0.62963
13	59	56	-3	94.92%	0.0536		Sum	1.848401
14	75	83	8	110.67%	0.0964		Count	10
15	82	87	5	106.10%	0.0575		Confidence Level(95.0%)	0.129062
16	74	61	-13	82.43%	0.2131			
17	57	53	-4	92.98%	0.0755			
18	44	27	-17	61.36%	0.6296			
19	18	10	-8	55.56%	0.8000			
20	6	4	-2	66.67%	0.5000			
21	3	2	-1	66.67%	0.5000			
22	3	4	1	133.33%	0.2500			
23	2	2	0	100.00%	0.0000			
Total		Sum	-2					
		Average	-0.08	95.05%	0.4274			
		Neg	9					
		Pos	9					
		Zero	6					
			24					

Hourly Uphill and Downhill 8/26/15: Less Busy Day

8/26/2015					Abs Value			
Hour	UphillRSG	UphillFOTSC	FOTSC-RSG	PercentFOTSC/RSG	(FOTSC-RSG)/FOTSC			
0	0	0	0			For9a - 6p Traffic	For9a - 6p Traffic	
1	0	0	0			0.1000		
2	0	0	0			0.0746	Mean	0.090098507
3	2	2	0	100.00%	0.0000	0.0449	Standard Error	0.020879172
4	1	3	2	300.00%	0.6667	0.1356	Median	0.087974684
5	9	9	0	100.00%	0.0000	0.1077	Mode	0
6	3	3	0	100.00%	0.0000	0.0759	Standard Deviation	0.066025739
7	5	3	-2	60.00%	0.6667	0.0000	Sample Variance	0.004359398
8	13	14	1	107.69%	0.0714	0.2083	Kurtosis	-0.292413398
9	27	30	3	111.11%	0.1000	0.0000	Skewness	0.217670762
10	62	67	5	108.06%	0.0746	0.1538	Range	0.208333333
11	85	89	4	104.71%	0.0449		Minimum	0
12	67	59	-8	88.06%	0.1356		Maximum	0.208333333
13	58	65	7	112.07%	0.1077		Sum	0.900985068
14	73	79	6	108.22%	0.0759		Count	10
15	65	65	0	100.00%	0.0000		Confidence Level(95.	0.047231969
16	58	48	-10	82.76%	0.2083			
17	20	20	0	100.00%	0.0000			
18	15	13	-2	86.67%	0.1538			
19	8	8	0	100.00%	0.0000			
20	0	0	0					
21	0	13	13		1.0000			
22	2	1	-1	50.00%	1.0000			
23	0	0	0					
Total		Sum	18					
		Average	0.75	106.63%	0.2266			
		Neg	5					
		Pos	8					
		Zero	11					
			24					

8/26/2015					Abs Value			
Hour	DownhillRSG	DownhillFOTSC	FOTSC-RSG	PercentFOTSC/RSG	(FOTSC-RSG)/FOTSC			
0	0	0	0			For9a - 6p	For9a - 6p	
1	0	0	0			0.045454545		
2	0	0	0			0.162790698	Mean	0.084193
3	0	0	0			0.012987013	Standard Error	0.026028
4	0	0	0			0.036144578	Median	0.057939
5	0	4	4		1.0000	0.071428571	Mode	#N/A
6	11	7	-4	63.64%	0.5714	0.027777778	Standard Deviation	0.082307
7	5	5	0	100.00%	0.0000	0.042253521	Sample Variance	0.006774
8	8	9	1	112.50%	0.1111	0.070422535	Kurtosis	3.907044
9	21	22	1	104.76%	0.0455	0.285714286	Skewness	1.963191
10	36	43	7	119.44%	0.1628	0.086956522	Range	0.272727
11	78	77	-1	98.72%	0.0130		Minimum	0.012987
12	80	83	3	103.75%	0.0361		Maximum	0.285714
13	60	56	-4	93.33%	0.0714		Sum	0.84193
14	70	72	2	102.86%	0.0278		Count	10
15	74	71	-3	95.95%	0.0423		Confidence Level(95.0%)	0.058879
16	66	71	5	107.58%	0.0704			
17	27	21	-6	77.78%	0.2857			
18	21	23	2	109.52%	0.0870			
19	13	10	-3	76.92%	0.3000			
20	2	2	0	100.00%	0.0000			
21	0	0	0					
22	2	2	0	100.00%	0.0000			
23	0	0	0					
Total		Sum	4					
		Average	0.17	97.92%	0.1661			
		Neg	6					
		Pos	8					
		Zero	10					
			24					

APPENDIX 2: ACCUMULATION COUNTS FOR THE CADILLAC MOUNTAIN SUMMIT ROAD 9/6/15 AND 10/3/15.

Ascending and Descending Traffic Counts and Vehicle Accumulation Counts by the Hour for the Cadillac Summit Road System on 9/6/15 and 10/3/15.																								
9/6/15	1a ¹	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12n	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12 m
Up	3	1	0	3	63	311	13	28	62	133	264	266	221	239	261	231	239	284	354	34	23	52	17	9
Down	-	1	1	1	2	3	321	68	36	63	127	246	256	249	252	228	261	197	196	447	31	38	40	15
Cum	-	3	2	4	65	373 ²	65	25	51	121	258	278	243	233	242	245	223	310	468	55	47	61	38	32
10/3/15	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12n	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12 m
Up	0	0	0	2	0	184	58	26	90	284	402	368	330	382	354	324	360	448	50	8	18	24	6	4
Down	-	0	0	0	2	0	176	66	40	120	272	390	396	352	378	334	312	218	556	22	12	24	12	10
Cum	-	0	0	2	0 ³	184	66	26	76	240	370	348	282	312	288	278	326	556	50	36	42	42	36	30

1. Counts refer to traffic in the preceding hour.

2. For example, 373 is the sum of 65 plus 311 minus 3.

3. This cumulative total of 0 offers a good example of how length of stay can impact accumulation counts. Two vehicles went up between 3:00 a.m. and 4:00 a.m. and two went down between 4:00 a.m. and 5:00 a.m. suggesting there were zero vehicles accumulated on the system during that hour. However, those two vehicles may have spent most of that hour at the summit and descended at the end of the hour, crossing the traffic counter at 4:59 a.m. The method is imperfect, but not everyone will behave the same way. As more vehicles accumulate, visitor length of stay behavior likely begins to approach a more predictable bell-shaped curve, even though we don't know the shape or magnitude of that curve.